

Report on Delta ISB Meeting of April 7-8 on
Adaptive Environmental Management
Chapter of the Second Staff Draft Delta Plan

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On behalf of the Delta Independent Science Board

The Delta Independent Science Board, with all ten of its members present, met April 7th and 8th in Sacramento. While our intention had been to review the first draft of the Delta Plan at our March meeting and the third draft at a May meeting, the incomplete nature of the first draft and promises for more in the second draft led to this April Meeting. However, the only chapter on which clear and substantial progress had been made since the material we reviewed for the first draft was Chapter 2, *Science and Adaptive Management for a Changing Delta*. As a consequence, the DISB is not providing review comments on the second draft. Rather, this report summarizes our efforts to assist the authors of this chapter on adaptive environmental management. This report characterizes the nature of our discussions at the meeting. This report is not a formal review, and the DISB did not hold a teleconference call to approve this report. We apologize for belaboring this subtle distinction, but we document in this way that the members of the DISB remain very conscious of our legislative mandate to serve as reviewers of the Delta Plan and the Council's request for assistance in developing the Delta Plan.

Our discussions with the authors of the chapter on adaptive environmental management can be summarized as follows:

1. The chapter reads like an academic description of adaptive environmental management (AEM) rather than an integration of the principles of AEM into a plan for governing the Delta based on best available science.
 - a. AEM uses science, but it also generates science, and just where science "comes from and goes to" as well as how knowledge and data are maintained are missing from the chapter. AEM needs to operate in the context of a broad scientific plan for the Delta. Such a Science Plan is neither developed nor referred to as being developed in the early April draft of this chapter.
 - b. AEM entails frequent decision-making. Adaptation entails moving from a prior management strategy to a new strategy within time frames that typically do not allow for the same type of review by higher authorities, let alone democratic processes. Either the AEM chapter or the governance chapter needs to elaborate on which levels of science-managers can make what magnitude of adaptive changes in appropriate time frames. Similarly, new issues of trust and trust-building processes, including adequate monitoring and transparency, need to be addressed to formally set the stage for a clear and successful transition to AEM. The board also noted, however, that one of the failings of earlier AEM projects

has been the desire of managers to keep tinkering with the process before there was sufficient evidence to justify any tinkering. If AEM is to provide reliable information as well as effective management then management programs have to be in place following an agreed script long enough for them to be evaluated.

2. Conceptually, AEM entails being consciously open to alternative understandings and related hypotheses about how the Delta “works.” In “passive” AEM, one model of, or framework of understanding, the system, is used to determine management interventions, but monitoring is set up so that if alternative hypotheses are sufficiently supported by the accumulating data, management practices can be adapted accordingly. In “active” AEM, more emphasis is put on learning about the system through management, perhaps, for example, through management practices that are different in different areas to determine which alternative understanding is better, or how the parameters of a model might be improved so that the model is more predictive. Whether active or passive, AEM requires consciously having alternative understandings and hypotheses about how the system will respond in mind and monitoring accordingly so that the science-manager is prepared to responsibly adapt.
3. In a world of foreseeable changes driven by climate change and other drivers, the DISB discussed how AEM should be anticipatory, drawing on forecasts of how the system may be changing as well as on understanding of historic dynamics. Anticipatory Adaptive Environmental Management is relatively undeveloped, but seems to be especially pertinent to the Delta.
4. As described in 2 and 3, AEM is intrinsically about working with uncertainty and with conflicting scientific information, but the process of choosing, and who is responsible for choosing, one model for management intervention over another, especially in passive AEM, still needs to be elaborated. This could be one of the central issues to be addressed in a chapter on a Science Plan.
5. Much of our discussion with the authors centered on Figure 2.1 as a way of communicating the essence of AEM. There was concern that “planning” was portrayed as too large of a portion of AEM and that monitoring and communication were portrayed as occurring at particular times rather than as throughout the cycle. Additional figures may be appropriate to illustrate how AEM works across different scales and to better illustrate the timing of decision-making.
6. Our discussions with the authors repeatedly looped back into the questions of monitoring systems: how elaborate they should be; how data should be processed, stored and made accessible; and how decisions would be made to initiate new monitoring efforts as well as to terminate existing monitoring efforts. These issues need further explication in the chapter or in another chapter on the Science Plan.
7. The DISB discussed “performance measures” in the context of monitoring and reasonable interim targets with respect to longer-term goals. AEM highlights how goals and expectations of performance also need to be adjusted as the Delta exhibits new characteristics and dynamics over time.
8. With respect to “best available science,” the DISB favorably viewed the approach elaborated in the Delta Regional Ecological Restoration Integrated Plan (DRERIP, made available at our meeting).

9. Table 2.2 on best available science could use some modification in terms of scientific credibility and timeliness. The DISB noted that there are better and poorer peer-reviewed journals such that reports reviewed within agencies can sometimes be more reliable than poorer peer-reviewed journals. The DISB also noted that there are now electronic journals with fast turn-around times whereas some agencies are very slow in getting their work reviewed and published so that peer reviewed science is not necessarily slow and agency science fast. A public participant noted that professional engineering review may entail fewer reviewers, but the reviewer is putting his or her professional credentials behind the review.
10. The DISB suggested that examples of AEM and the use of “best available science” could be drawn from the Delta, even if they had some weaknesses in their design and execution, indeed, by using imperfect local examples, key points and the need for change could be made more strongly.
11. Our discussions, like this summary, repeatedly linked back into the need for a Delta Science Plan. The DISB expects the Delta Science Program (DSP) to play a central and significant role in helping with the coordination, planning, funding, and communication of Delta science, as it has in the past. Yet its role in the past has largely been to facilitate a collaborative effort. Under a Delta Plan, the DSC could have a stronger role, perhaps as a clearinghouse to coordinate science planning among the agencies, perhaps as a unit that assures that monitoring is coordinated, that data are well-stored and made accessible for, for example establishing baselines, or base regimes, etc. The success of adaptive environmental management depends on quality, up-to-date, linked, and accessible scientific information that is improving through time. “Best available science” can be better science over time with a science plan.
12. Lastly, connecting the best available science to policy and management is too critical to the success of the Delta Plan to be presented in a short chapter. AEM is not a simple idea to convey, let alone elaborate for practice, and the linkages to chapters on a Science Plan and on Governance need to be clear and/or more aspects of the science plan and governance need to be brought into this chapter.